REMARKS

Claims 1-6 stand rejected under 35 U.S.C. 102(e) as being anticipated by Noguchi et al. (U.S. 5,862,022). Applicants respectfully traverse this rejection because the cited reference does not disclose (or suggest) a magnetic sensor with a barrier layer having a smaller thickness region which does not include and edge part of the barrier layer, as in claim 1 of the present invention, as amended.

Noguchi discloses a magnetic conversion element 2 having two insulating films 210, 213 located over a ferromagnetic film 211. (See Fig. 46). The Examiner asserts in Paper No. 14 that the combination of insulating films 210 and 213 is analogous to the barrier layer of the present invention, and that a region D1 of Noguchi is analogous to the region of the present invention which functions as a sensor portion for sensing an external magnetic field. Even if the Examiner's analogy were correct, Noguchi still would not teach or suggest claim 1 of the present invention, as amended.

Claim 1 of the present invention has been amended to correct for an inadvertent typographical error from Amendment A, filed November 14, 2002, which incorrectly amended claim 1 to recite that the first (smaller thickness) region of the barrier layer was "inside" the edge part of the barrier layer. As Fig. 8 of the present Application shows, the region 13 of reduced thickness is a region except the edge part of the barrier layer, and not *inside* it. This feature of the present invention is neither taught nor suggested by Noguchi.

Noguchi clearly shows in Fig. 46 that a portion of the thicker insulating film 213 extends past the end of a first electrode film 22, and into the region D1 – the region D1 being asserted by the Examiner as analogous to the smaller thickness region of the present invention. In other words, the combination of the insulating film 210 and the extending edge of the insulating film 213 within the region D1 does not exclude the edge part, as in the present invention. Accordingly, because Noguchi clearly shows edge part of the barrier layer included within the smaller thickness region, the Section 102 rejection of claim 1 of the present invention based on Noguchi is respectfully traversed for at least these reasons.

Claims 2-6 all depend either directly or indirectly from independent claim 1 of the present invention, and therefore include all of the features of the base claim, plus additional features. Accordingly, the Section 102 rejection of claims 2-6 based on Noguchi is also respectfully traversed for at least the reasons discussed above in traversing the rejection of independent claim 1.

Additionally, Noguchi also fails to suggest the present invention because the region of the barrier layer of the barrier layer excluding the edge part is a region where the effect of the demagnetizing field is small. Because this particular region (excluding the edge part) of the present invention functions as a sensor portion for sensing an external magnetic field, it is possible in the present invention to obtain a significantly larger rotation angle of a magnetic direction in the sensor portion than could be realized by a device as taught by Noguchi, for example. The present invention, therefore, realizes a magnetic sensor of

advantageously higher detection sensitivity than Noguchi. Applicants respectfully request that the Examiner consider these remarks in addition to those discussed above in reconsidering the patentability of claims 1-7 of the present invention.

Claims 7-9, 14, and 17 stand rejected under 35 U.S.C. 102(e) as being anticipated by Gill (U.S. 6,108,177). Applicants respectfully traverse this rejection because the cited reference does not disclose (or suggest) either a member of high permeability spaced from a ferromagnetic tunnel junction element, or an end portion of the free layer projecting from a ferromagnetic tunnel junction element and connecting to a high permeability member, as in claim 7 of the present invention, as amended.

Gill discloses a tunnel junction structure having a second shield layer 212, a free layer 210, a spacer layer 208, a pinned layer 206, and a pinning layer 204 layered in this respective order, with no intervening layers, or portions of other layers departing from this order. (See Fig. 9). The free layer 210 (which the Examiner asserts is analogous to the free layer of the present invention) is shown to directly contact the second shield layer 212 (which the Examiner asserts is analogous to the high permeability member of the present invention), yet the free layer 210 is not shown to be spaced from the second shield layer 212 in any way.

In contrast, claim 7 of the present invention recites, among other things, that a ferromagnetic tunnel junction element, which includes the free layer, is spaced from a member of high permeability. Gill shows no such structure. Gill's free layer 210 directly contacts Gill's second shield layer 212 across their entire respective lengths. Although other

layers disclosed by Gill can be said to be "spaced from" the shield layer 212, the same cannot be said for the ferromagnetic tunnel junction element itself. Gill would have to show some spacing between the free layer 210 and the shield layer 212 in order for the Examiner's analogy to be correct in this respect. Accordingly, because Gill makes no such showing, the Section 102 rejection of claim 7 based on Gill is respectfully traversed for at least these reasons.

Moreover, the Examiner further asserts in Paper No. 14 that Gill's free layer 210, pinned layer 206, spacer layer 208, and pinning layer 204 are analogous to the free layer, the fixed layer, the barrier layer, and the antiferromagnetic layer respectively of the present invention. However, even if this analogy were also correct, Gill still would not disclose the structural configuration of the present invention. Gill clearly shows that all of its layers extend in the same direction without projecting from any of the other layers. The shape of all of the entire layers 204, 206, 208, and 210 is also shown to be the same.

Claim 7 of the present invention, on the other hand, has been amended to more clearly recite, among other things, that the end portion of the free layer, which extends from and projects from the ferromagnetic tunnel junction element, contacts the high permeability member. Because Gill fails to teach or suggest any such end portion to the free layer 210 (or any of the other layers for that matter) extending from or projecting from itself – as part of the ferromagnetic tunnel junction element – and also contacting the second shield layer 212,

the Section 102 rejection of claim 7 of the present invention based on Gill is respectfully traversed for these additional reasons.

Claims 8-9, 14, and 17 all depend directly or indirectly from independent claim 7, and therefore include all of the features of the base claim, plus additional features. Accordingly, the rejection of claims 8-9, 14, and 17 based on Gill is respectfully traversed for at least the reasons discussed above traversing the rejection of independent claim 7.

Claim 7-8, 11-12, and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi in view of Gill. With respect to claims 7-8 and 11-12, Applicants respectfully traverse for at least the reasons discussed above. Neither Noguchi nor Gill, whether taken alone or in combination, discloses or suggests the ferromagnetic tunnel junction element being spaced from the high permeability member, or the end portion of the free layer and projecting away from the ferromagnetic tunnel junction element and contacting the high permeability member.

With respect to claim 15 in particular, however, Applicants further respectfully traverse this rejection because both Gill and especially Noguchi fail to show anywhere where the free layer is bent away from the fixed layer in a region which is not opposed to the fixed layer. In fact, neither of the two cited references teaches or suggests any bend to the free layer.

As discussed above, Gill discloses a free layer, which extends in one single direction only. Noguchi shows a similar structural configuration to the free layer. Fig. 46 of

Noguchi, for example, shows only a planar configuration extending in a single direction for the ferromagnetic film 211, which the Examiner has identified as a free layer. Nowhere does Noguchi teach or suggest any bend of the film 211 away from the second ferromagnetic film 212, which the Examiner has identified as a fixed layer. Applicants note that the Examiner has not cited to anywhere specifically in Noguchi to support his assertion on Page 5 of Paper No. 14 that the free layer is bent away from the fixed layer in a region not opposed to the fixed layer. Because no such structure is taught or suggested by Noguchi, the rejection of claim 15 of the present invention based on a combination of Gill and Noguchi is respectfully traversed for at least these reasons as well.

Claims 13, 16, and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Gill in view of Fujishima et al. (JP 07073419). Applicants respectfully traverse this rejection for at least the reasons discussed above. Clams 13, 16, and 18 all depend either directly or indirectly from independent claim 7. Fujishima has been cited only for teaching that the fixed layer is not exposed to the signal detection surface. Fujishima neither discloses nor suggests spacing features or the projecting features of the present invention discussed above. Accordingly, the Section 103 rejection of claims 13, 16, and 18 is respectfully traversed for at least these reasons.

For all of the foregoing reasons, Applicants submit that this Application, including claims 1-9 and 11-18, is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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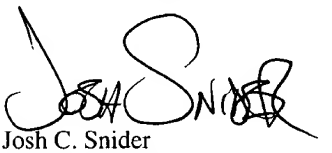
By 
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